



All about the FTC Engineering Notebook

Have you read Section 5 of the current Game Manual part 1? The game manual is the final authority on the engineering notebook. Even if you read it last year, changes and clarifications are frequently added. Make sure you are completely up to date with any new wording.

Why an Engineering Notebook?

An engineering notebook is a working document. It is where ideas, sketches, and team thoughts are recorded in addition to the final production information about your team and robot. It is a journal your whole team will use to help everyone know what's going on, where you record your testing data, and it is a record of your abandoned ideas and prototypes.

- 1) Engineering notebooks show the thought behind your strategy, designs, innovations, and organization. They show how each team member contributes and how your team overcomes obstacles. These things are hard to see at an event when you are there with a finished product.
- 2) Your engineering notebook is the primary reference for your team. It records all thoughts at meetings and events, all ideas for robot design, all changes to the code (although the actual code does not need to be included), and game strategy. The notebook is a tool for the entire team to communicate together. It should be used as a reference for the team as well as for the judges.
- 3) Engineering notebook is a tool you can use to show how your team works, what you do, and the concepts you are exploring with your sponsors and potential sponsors.

Is the *FIRST* Formatting Guideline Important?

The short answer is yes, the formatting guide laid out in Section 5 of the Game Manual Part 1 is important. Some of the guidelines are presented as optional, but by closely following the guidelines you make your engineering notebook easier for the judges to understand and eligible for the Think and Inspire awards.

Before you flip to section 8, take a close look at section 5.3 and 5.4 in the current Game Manual. If you plan to use a handwritten notebook it is a good idea to divide the sections before you start writing, or decide if you want to use multiple small notebooks to document your season. Keep in mind that your meeting discussions are as important as your engineering, game strategy, and programming thoughts when considering the awards. Showing how your team uses all of its strengths to overcome engineering challenges is critical – and that includes all aspects of the team. You also have the option of using an electronic notebook. These can be easier to use if you are meeting in different places, as long as you have access to it, no one will have forgotten to bring the notebook. While the judges do not differentiate between a handwritten notebook and a printed one, there are pros and cons to each your team should consider.





Handwritten Engineering Notebook	Electronic Engineering Notebook
<p>Pros:</p> <p>Easy to use – everyone can write on paper</p> <ul style="list-style-type: none"> • Already printed and bound, what you see is what you have • Easy to show how the whole team contributed with different writing styles, ink, and signatures • Easy to reference during the build season • Shows it's use with stains, cross outs, and worn pages • Easy to add tabs and make ready for competition (the pages your team referenced the most will be the ones the judges want to see.) 	<p>Pros:</p> <ul style="list-style-type: none"> • Available anywhere (if in the cloud) • Spell Check, and legible • Easy to add images and summaries, and they won't fall out • No worries about running out of pages in a section and running into the next section • If you forget it at home, it can be reprinted anywhere. • Can print a new copy to mark for each competition. – although not necessarily advised
<p>Cons:</p> <ul style="list-style-type: none"> • Each section needs to be decided at the beginning of the season, it's not possible to change mid way through. If you don't have enough pages you have to use pages in the back or a second notebook. • Not everyone has really legible handwriting, or spelling, but everyone does need to contribute. • Must be remembered everywhere you go, especially tournaments. 	<p>Cons:</p> <ul style="list-style-type: none"> • Not easy to tell that everyone has contributed to the notebook. • Need to remember to print and get it in an appropriate binder for each tournament. • Sometimes needs reformatting to print nicely. • Adding hand drawings, pictures, PTC renderings takes more effort.

Now that you have decided on your notebook/notebooks, get out a sharpie and put your TEAM NAME, and TEAM NUMBER on the notebook. This is one of the most important things you can do! It not only helps the judges find your notebook in the mountain of engineering notebooks at a tournament, but it lets those same judges know you care about your notebook and can follow basic instructions. No matter how nice your cover is, if a judge has to hunt to find your team number, it does not leave them with a good impression – even before they look inside. Remember the judge is your advocate to being considered for awards, you want them to have a positive impression of the team in every way possible.

How Section 8 of the Game Manual part 1 Matters

The judging and award criteria have a lot to say about the engineering notebook, and more specifically what needs to be in it for each award. For the inspire award your engineering notebook must meet or exceed every requirement for all of the other awards. You should not be eligible for inspire, if you are missing any of the key sections, or formatting requirements. Consider which awards your team wants to try for (I hope it's all of them), and then plan your notebook accordingly.

Pay extra special attention to the engineering notebook requirements for the Think award. You will see that all the guidelines in Section 5 are now requirements. Also, make a note of the required tabs/flags,





you will want to do this immediately before the tournament – it's a good idea to know what you want to highlight as you go through the season. You may change your mind, but you won't have to read every page of your notebook to decide. Resist the urge to flag everything, the judges want to clearly see the best you have to offer.

The Connect Award requires your business plan to be included in the engineering notebook and will be focusing on your outreach efforts in the Team Section. The Rockwell Collins, PTC Design, and Control award all have special requirements of the engineering section of your notebook. The judges should be able to decide if you meet the requirements for these engineering awards, just from the content of your engineering notebook. Pay extra attention to the new requirements of the Control Award, judges need to be able to see and understand all of your control components from the engineering notebook, this is additional to the Control Award Content Sheet. Putting your Content Sheet in the notebook is not going to be enough to show your control components.

Some of this will be more important as you get to the tournament. Some of it needs to be designed into your engineering notebook.

Getting Started

Everything is going in this notebook, but right now it's a blank page or screen. So how do you get going?

- Make sure your Team Name and Team Number is on the cover – especially your Team Number, but both are required
- The next thing you need to do is set aside the first page for your team summary. You will want to do a draft of this page. It is the first impression you give to the judges! They will see your team summary before they even meet your team! Alternatively, you can fix your team summary to the backside of the front cover.
- Label the next page table of contents. As you set the sections you will start filling this in! This will help keep your notebook organized and where you will highlight key pages you want the judges to look at.
- Divide the sections. You are welcome to organize the engineering notebook into more categories if you like, but remember, the chronology and connectedness between everything you do is important to the judges, especially strategy, design, build, and programming all work together to make your season.
 - You want a Team Profile section where each team member is introduced, preferably with pictures. Your outreach activities will also be described here, so leave space!
 - Your Engineering Section will be the bulk of your notebook. It will include all your team meeting notes, designs, programming thoughts, strategy ideas, and reflections. Each meeting will need its own page and you will want additional pages for your engineering notes.
 - Your Business Plan (optional)





- Add your first meeting to the table of contents, and create an entry in the Engineering section. On your tasks column include setting up your engineering notebook and your contribution policy; remember EVERY team member should contribute to the notebook! Don't forget the team reflections on the meeting – this is a good place to get contribution, by having each team member present take the pen (never use pencil!)

Stick with your notebook policy for every meeting! Everything needs to be in the notebook.

What do You Mean When You Say Everything Goes in the Notebook?

Every meeting, add the meeting to the entry to the table of contents, and then write your tasks and reflections. Every credible idea discussed needs to be included in the notebook – even the ideas that don't work out. Do not self censor your notebook! If you use a whiteboard to draw out ideas, take pictures, or have a team member sketch the ideas into the notebook. Make sure you leave space on meeting pages for photographs of what was happening – OUTLINE THEM IN INK and follow the picture inserting guidelines, pictures do occasionally fall out.

If you find yourself wondering if you should include something in the engineering notebook, do! Judges love the little bits of information that make your journey real like; ideas you discard because they are out of budget, when you sacrifice strategy because of a programming limitation, drawings sketched on napkins, the inconsequential details of a meeting – like celebrating a team member or coach's birthday, although honestly, judges don't need to know if the cake was good.

Tournament Time

You've done good, you've brought your engineering notebook to all team meetings and it's been a great resource for your team over the season. You've saved it from near fatal disasters. Your team has poured their heart and designs into it. Maybe you've even shown it to a few potential sponsors? But it is tournament time, and that's when the engineering notebook transforms from a working document for the team to keep their thoughts, ideas, and designs, into the written transcription of what makes your team special.

Now is the time to go back and flag pages for the judges. What entries really tell your team's story and show their strength? Where are your PTC or other design sketches? Where are the best pages to learn about the team's innovative idea? What about the Control Award? Great! You have your flags, you've highlighted your table of contents for the judges.

- Look at the front cover, is your TEAM NAME and TEAM NUMBER there and easy to read? Make it bolder if you need to – if you can put it on the binding too.
- Is your team summary on the first page or fixed securely to the inside of the front cover?
- Is your table of contents completely filled in with key entries highlighted for the judges?
- Every team member has a bio and their photo in the Team Section?
- Your Engineering section has all of your meetings, your designs, your notes and reflections? Have the key entries been flagged for the judges?





- Your business plan is fixed into your notebook, and added to the table of contents if it wasn't already.
- Your Bill of Materials is fixed into your notebook and added to the table of contents so the judges can find it quickly. Did you print a second copy for inspection?
- Page-by-page:
 - All pictures have ink borders with the page number on the back of the photo should it fall out?
 - All white space is X'd out?
 - Every page has a page number. It's okay, if the numbers restart for each section.
 - All corrections are crossed out a single time and dated?
 - Everything fixed to the pages is secure and not coming loose?

Review all of Section 8 again. Is there anything you can do to make those particular entries easier for the judges to find, read, and understand? You can't edit your pages, but you can flag them.

Remember to turn in your notebook when you check in at the tournament. The longer the judges have with your notebook, the more that can get from it. The judges should receive your notebook shortly after they arrive. You can still feel free to point out key passages in the judging room, just don't use all your time flipping pages – your flags can help you here.

After the tournament, whether you advance or not – Remember to pick up your engineering notebook!

